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FILE

DF 114
TICOM Document 2785

32/48/~~TOPSEC~~/AS-14-TICOM

GERMAN CRYPTANALYTIC DEVICE FOR SOLUTION OF M-209 TRAFFIC.

1. The attached is an Army Security Agency translation of TICOM Document 2785 item 19, German title:" Technicsche Erlaueterung zur maschinellen Bearbeitung von AM-1 Kompromisstextloesung auf 5er Texttiefe" (Technical note on machine treatment of AM-1 [= M-209] compromised texts in depth of 5 [for key]).

2. This is one of the reports of the Signal Intelligence Agency of the German Army High Command (OKH/GdNA/In 7/VI). As a result of information received by U.S. Military Intelligence Service, Austria, they were found buried in a campt at Glasenbach, Austria, and were forwarded through ASA, Europe, to TICOM at LSIC in May 1947.

3. From this paper the precise purpose of the device is not clear, neither is the manner in which it is supposed to function. Apparently it was devised to recover settings of the M-209 by using 5 messages with known or assumed plain text. Apparently the writer is not a trained mechanical engineer, neither does this appear to be a blueprint for construction purposes. Rather it appears to be a description resulting from actual use of the device (the words "1. Konstruktion" on the plate showing the Sprungtabellentasten may also be interpreted to mean that a working model existed). The account takes so much for granted that only one familiar with the device can comprehend it readily. One plate bears the date 29.4.1945.

4. Aside from its technical merits, if any, which must be evaluated by experts, the paper is of interest as an example of German cryptanalytic mechanical aids. No referencesto the use or even to the existence of such a "gadget" are recalled in other TICOM material. Further information as to who originated the device, the status of its development, and the disposition of any models constructed is desirable.

Translated: R.W.P.
13 April 1948

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T 2785
DF 114

Technical Note on machine treatment of AM 1 compromised texts [cribs?] in depth of 5 [for key].

Description

The apparatus consists of three parts:

1. Sprung-Kasten [skip box, a plug-board?]
2. Verteiler [Distributor].
3. Schaltapparatur [Switching device]

There are also several auxiliary parts: lamp panel, Setzbrett [plug-board?], batteries, rectifier unit.

1.) The Sprungkasten consists of 120 switch positions which can be opened by pressure. The pressure is applied by cylinders mounted above. Into these cylinders are inserted metal strips (lugs) belonging to the individual skips. Five cylinders are so slotted in 26 evenly distributed positions that the lugs can be inserted. Each slot is divided into 4x6 positions corresponding to the assumed four possible values of a skip which consists of 6 components corresponding to the six wheels of the AM 1 or M-209. To each of the 26 slots corresponds a skip. On the outer surface are inscribed the alphabets so that the cipher text can be set up directly when a plaintext has been set up. For this purpose the cylinder head (end) is divided into two parts, two disks, on one is the numbering, on the other the alphabetic division.

2.) Verteiler.

The purpose of the distributor is to scan all 45 combinations. To

accomplish this there is a stepped advance of the five wheels corresponding to the five cylinders. Each disk is divided on one side into four segments insulated from one another (6 grooves), and on the other into six continuous grooves. Between these two disks moves an arm (Zeiger) with carbon contacts which connect two grooves, one above the other. According to position, first the first segment then the second segment etc. is connected through the carbon brushes with the closed ring.

For the selective setting of a 5th skip possibility the lead to the switch device is again interrupted at the face wall and the lead can be set either on + or 0 [-], thus cutting out the entire distribution. From the distributor 30 leads run to the actual switching device:

3.) Schaltapparat:

The switching device consists of 6 test circuits (Diskussionskreise) corresponding to the six wheels of the AM 1.

Description of the test circuit: (Cf. sheet 1).

1). Test circuit: (red lines) -

From the plate battery the current comes into the 1st relay. According to its setting the relay is either at rest or energized, due to the bias. At rest means the — position is switched in, (in our diagram = to the right). Then a second switch position, consisting of two relays, distributes the current further, then come four relays wired in parallel, then 8 relays, then 4 switches (Schiele-Schalt-Schutzen). Finally 32 leads run to a like number of lamp sockets. If the current is so directed that where it must pass through a lamp (there will be only one possibility), it will be able to pass to the second test circuit if there is a lamp in that socket.

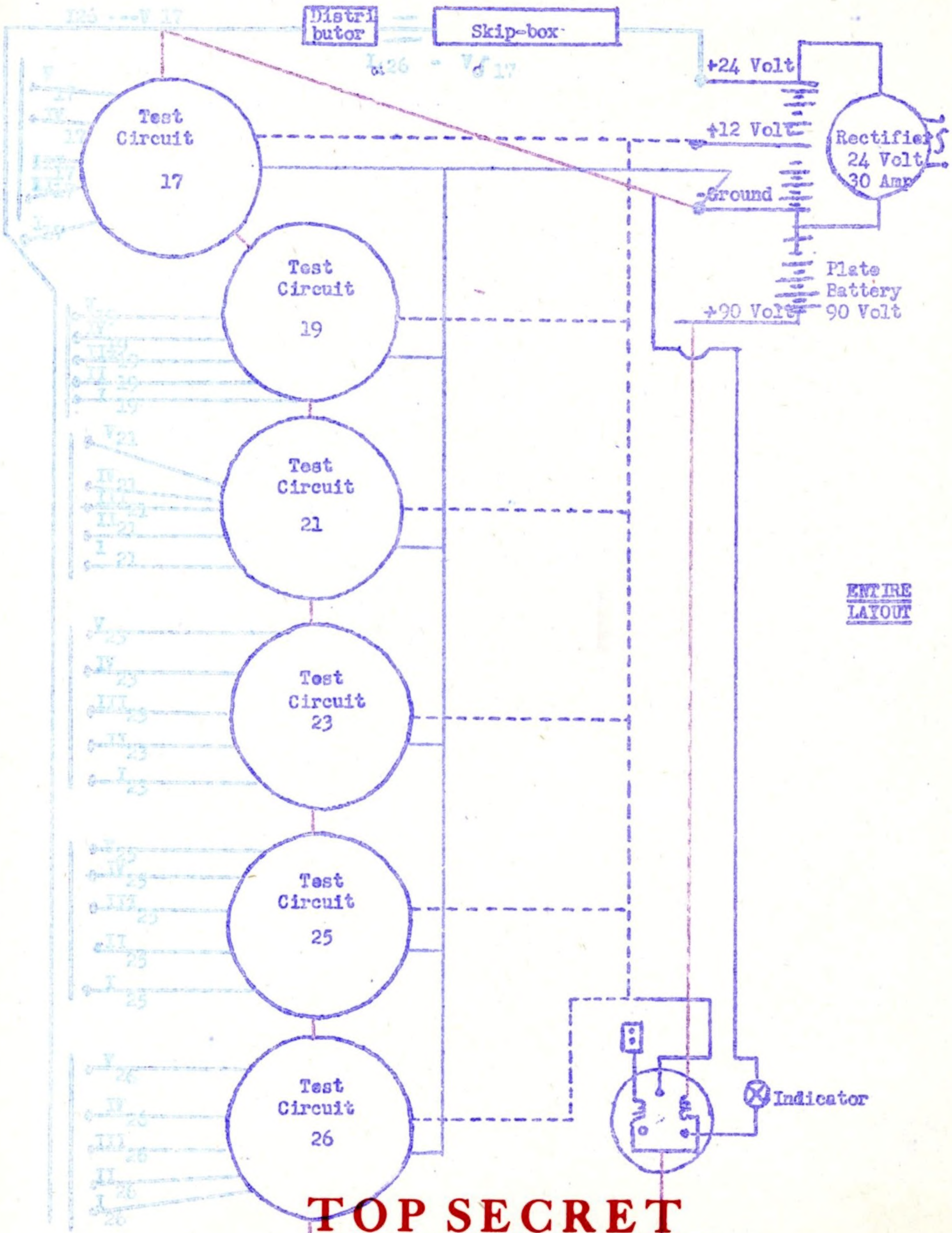
If no lamp has been inserted in that socket, the current cannot go beyond and the case is settled. After passing the six test circuits an

indicator relay is operated. This lies ahead of the Betrieb [ ] in such fashion that the indicator lamp does not light up. The relay is brought into this position by a switch. If current is flowing through all six test circuits, the relay is thrown over and the lamp burns steady. It can only be extinguished again by a switch.

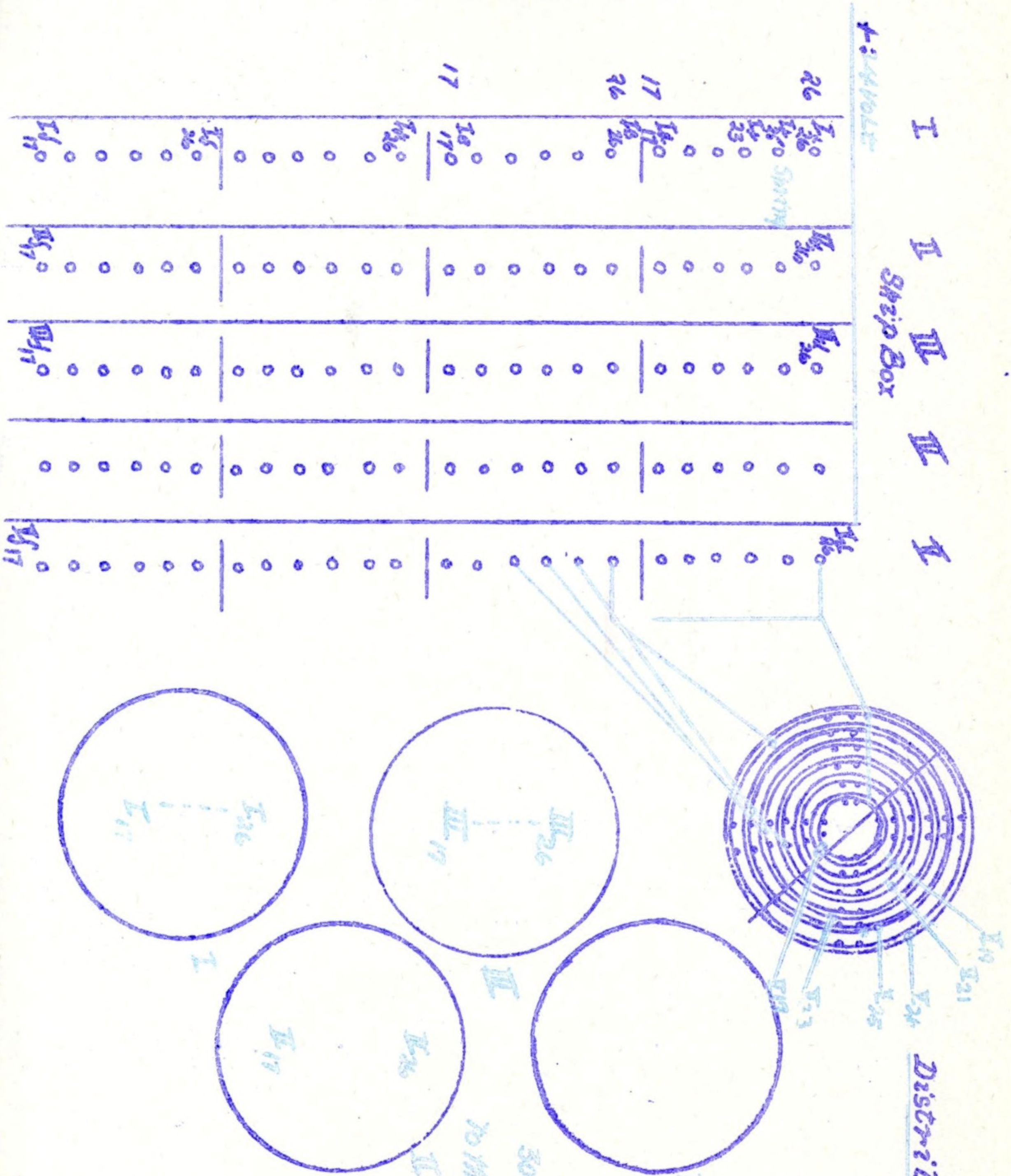
2.) Bias (yellow lines)

One coil of each relay is always on 12 volts so that rest position is assured when no control current results. Springs were avoided so as to be able to regulate this voltage by the applied voltage according to the working speed.

3.) Zero-potential (Ground)



ENTIRE
LAYOUT


Ship Box
Distributor

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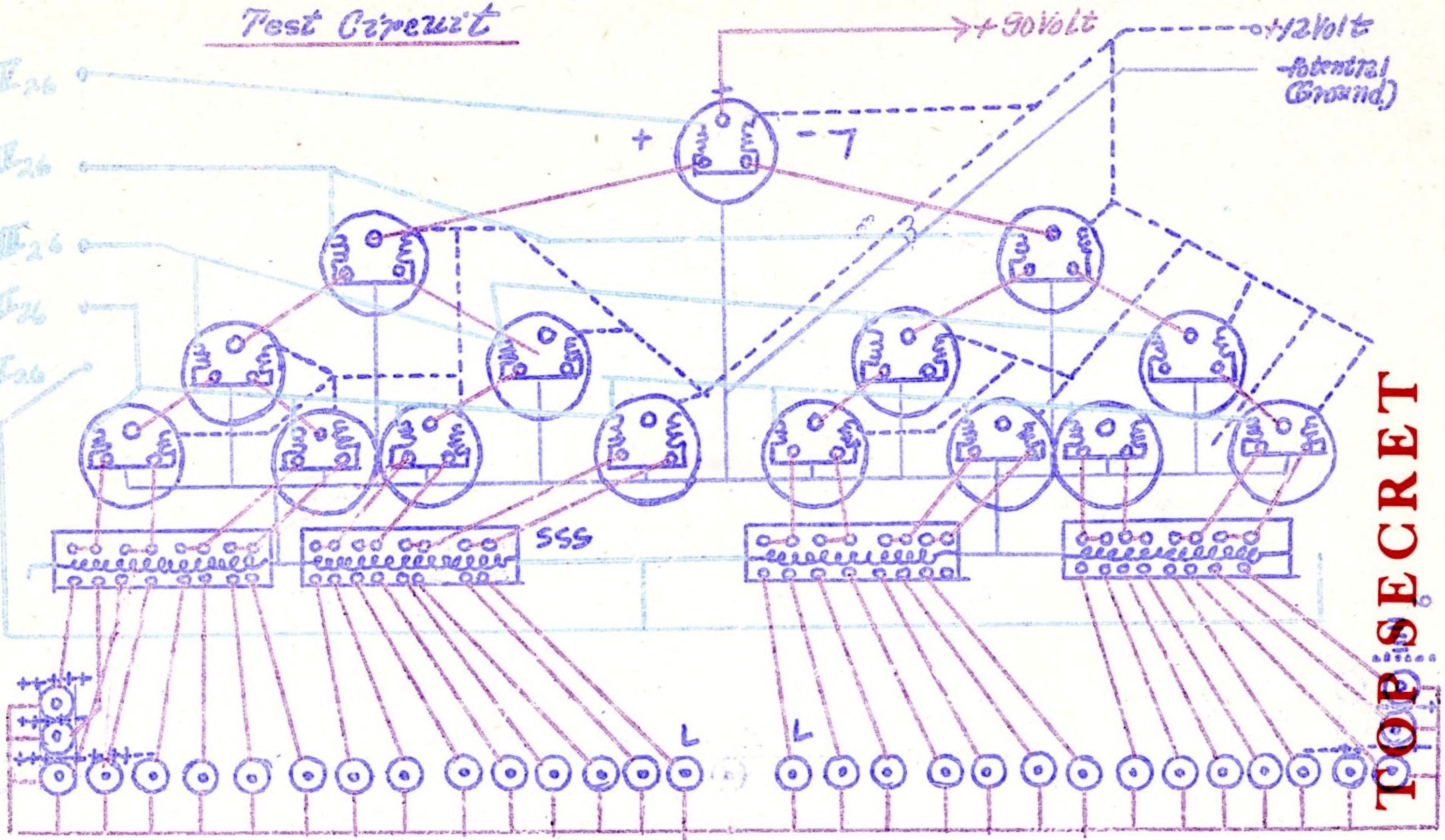
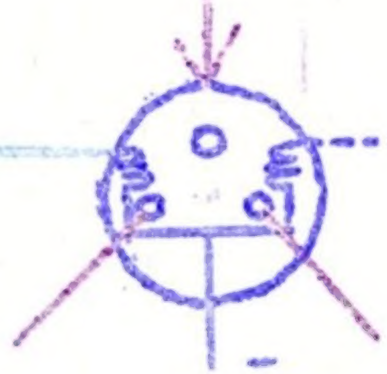
Test Circuit



26	+--+-
25	-+-++
23	+-+--
19	-+-++
17	+++-+
	I II III IV V

Sample Test.



Green =
Yellow (dotted line) =
Blue =
Red =

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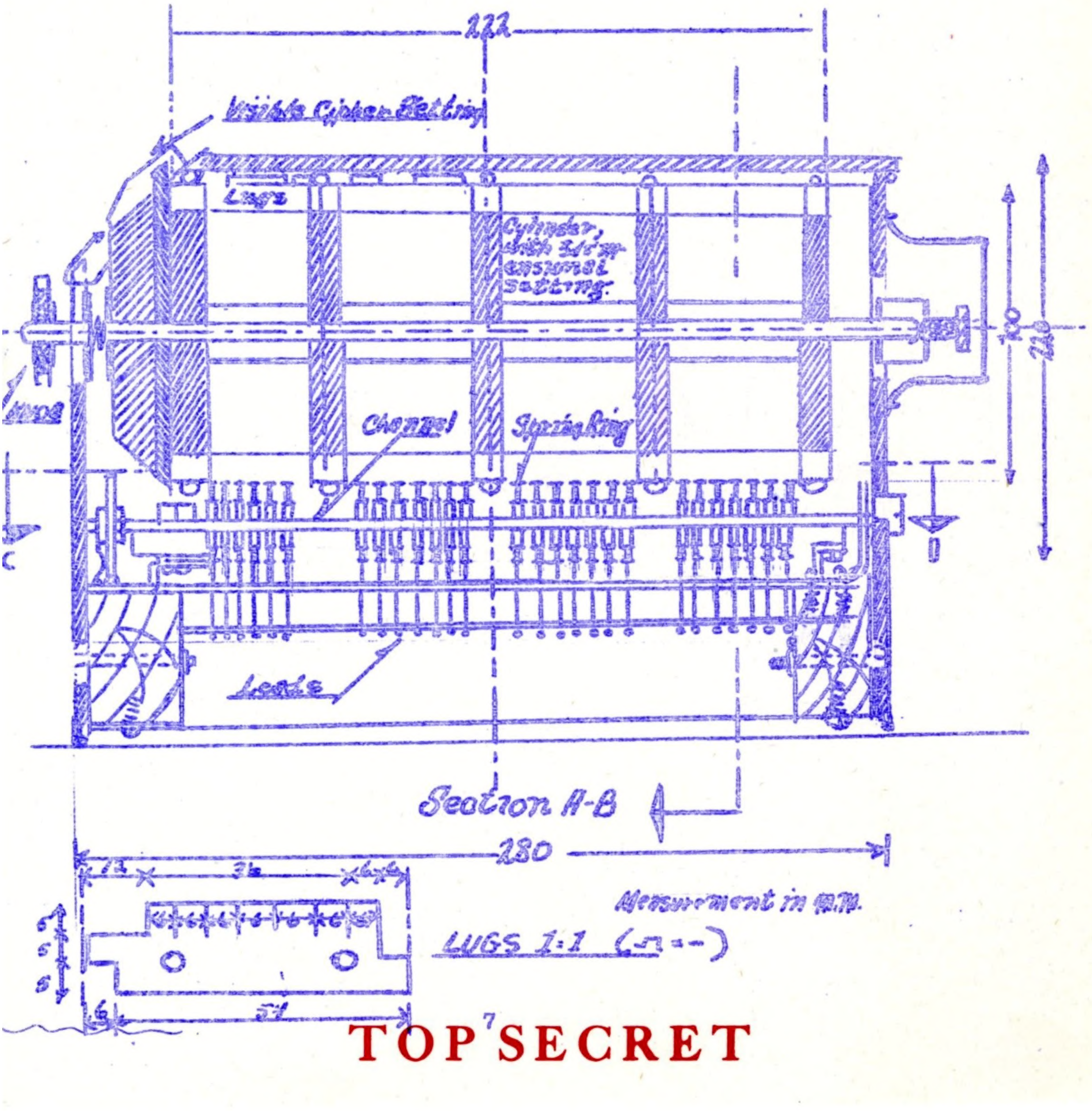
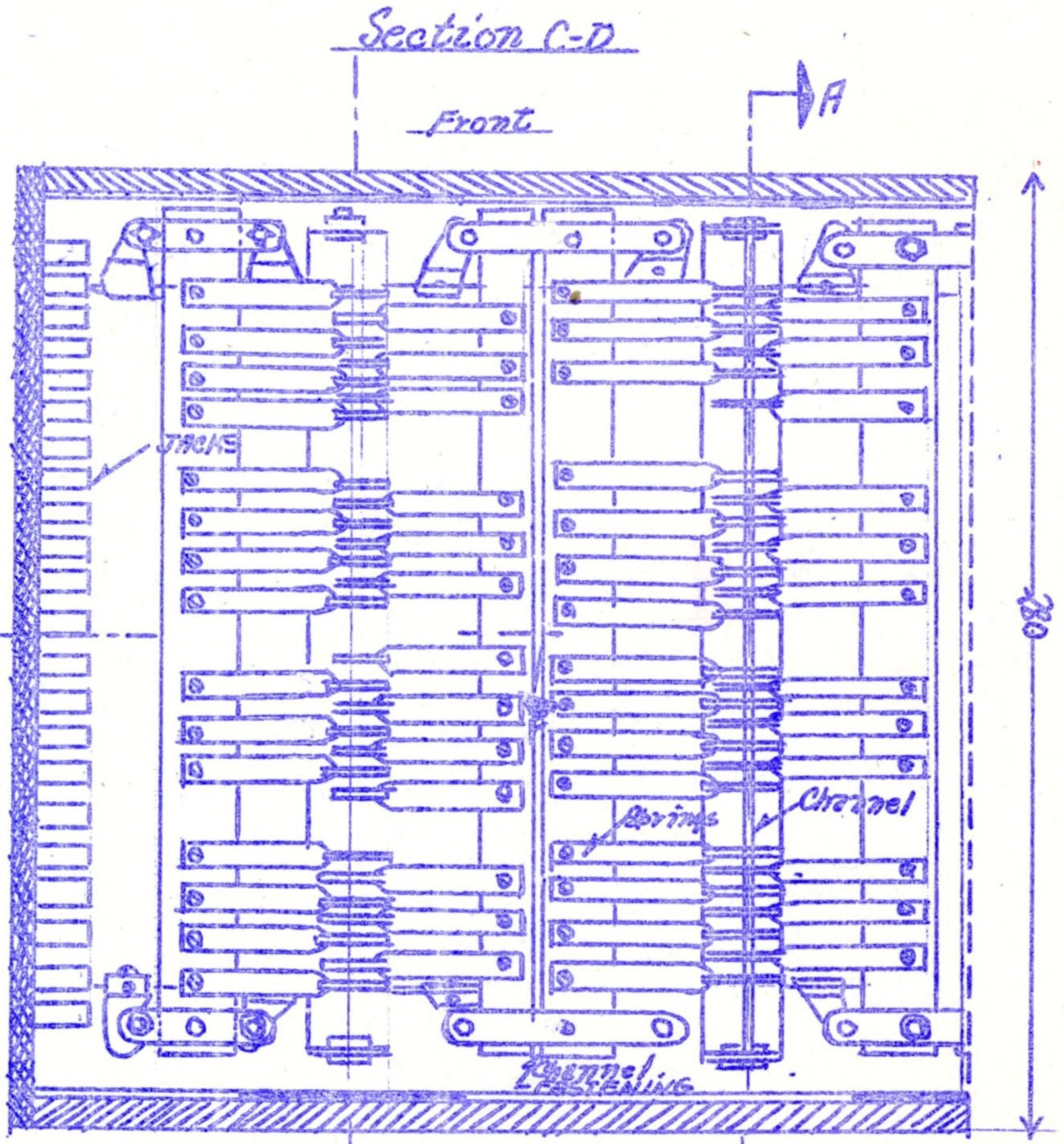
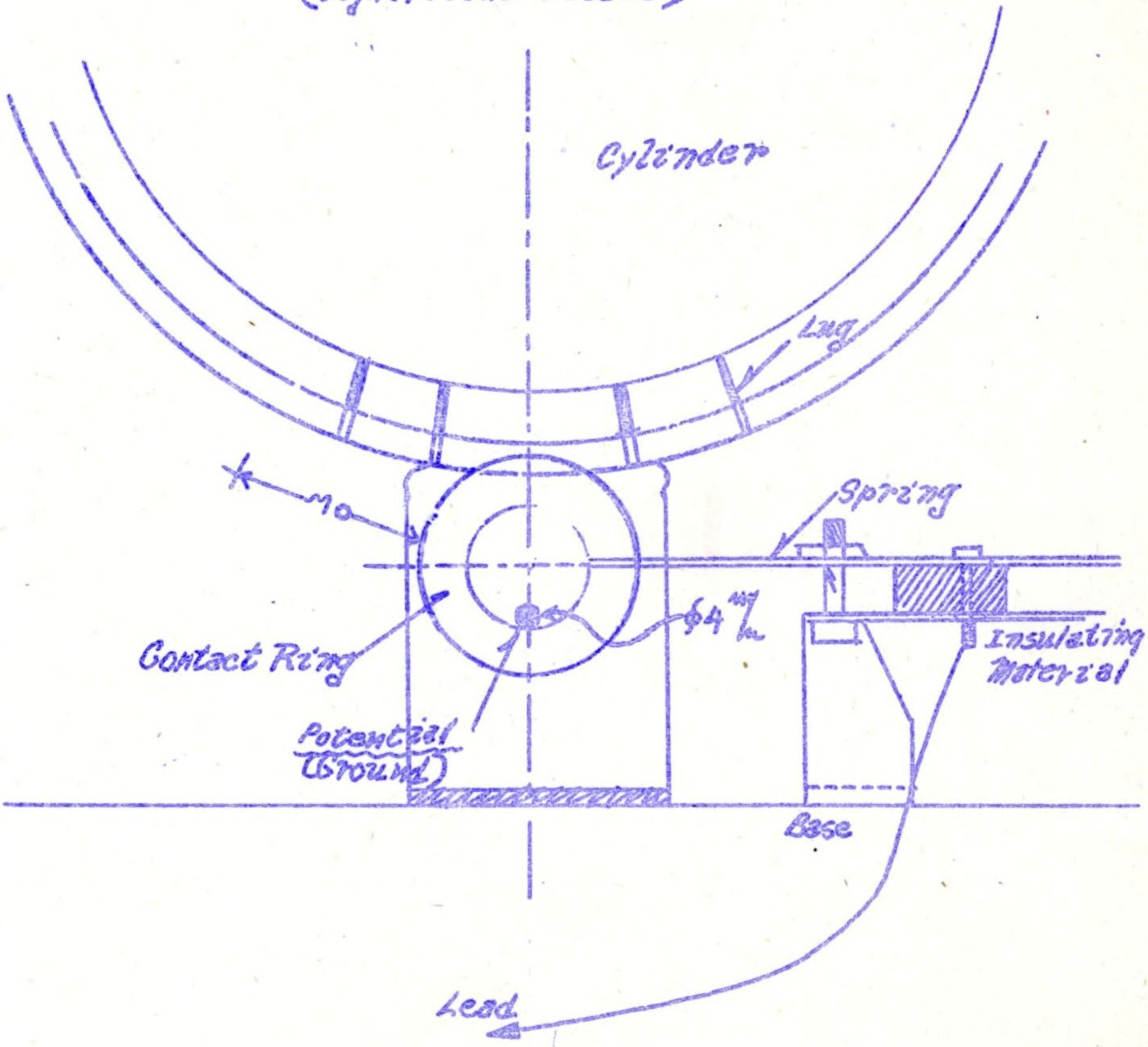
A. Skipbox - Sections and overall view of First Model - Scale 1:10




Section C-D
Front
A
TRACKS
E
Channel
Springs
Tunnel Ceiling
230
150
B

SECTION E-F
(Significant Detail)



M. 2:1

Explanation of sketches: sheets 1, 2, 3 and 4

General: Three colors are used: Green = Steuerung (control)
Blue = 0-Potential (ground)
Red = Diskussionskreis (test circuit)

There is also the bias (Vorspannung) which belongs to the control circuit.

Where necessary this bias is shown in yellow.

Sheet 1). General survey. The test circuit for wheels 17--26 has the following input and output leads respectively: test circuit, bias, ground and control circuits I_{26} to V_{17}. After the test circuits lies the indicator relay.

The control currents are conducted through the Sprungkasten and Verteiler (plugboard and distributor). From the battery a lead (24 v) runs to the plugboard.

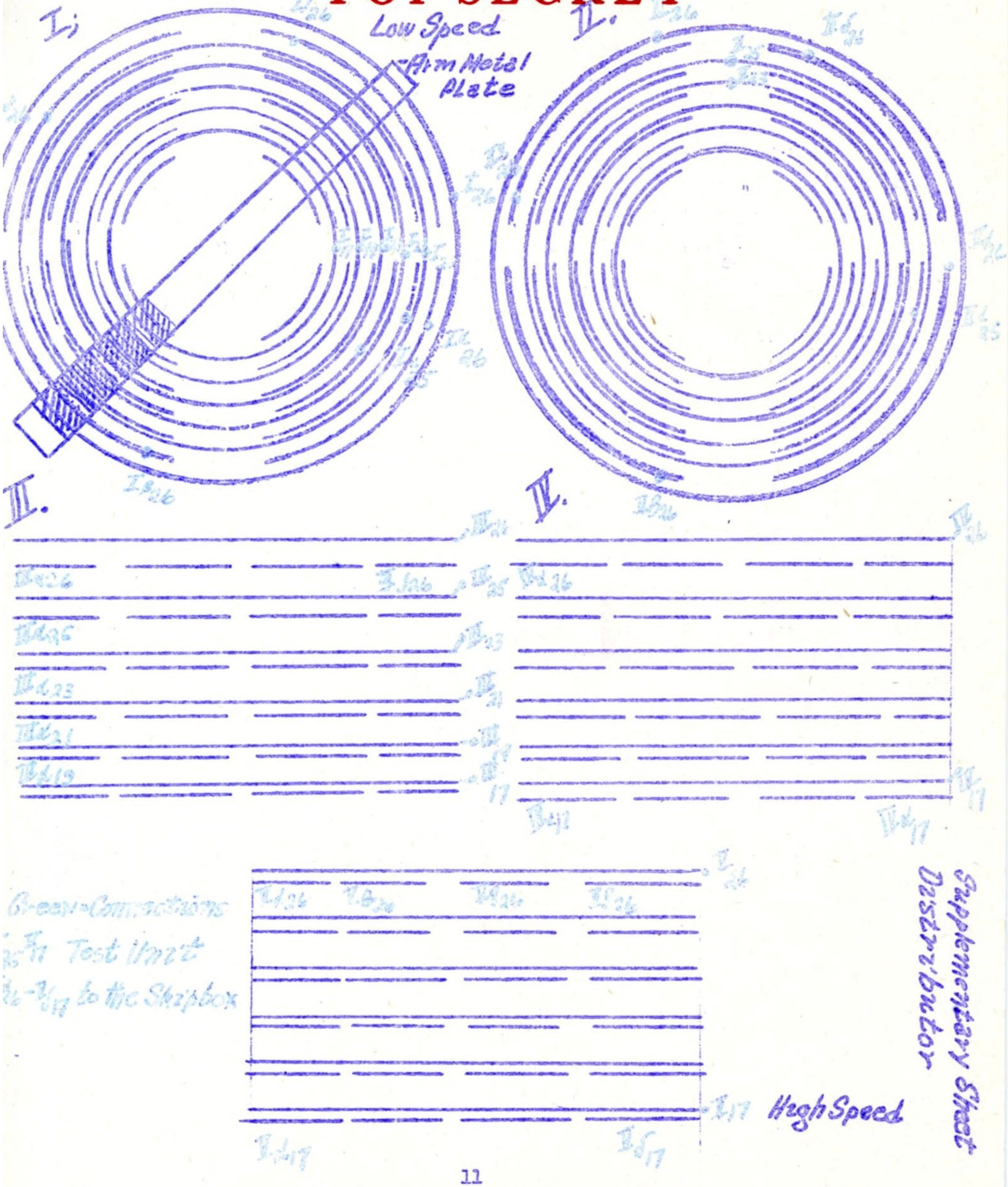
Sheet 2). Sprungkasten with the individual contacts. Each of the five cylinders has to activate 24 contacts. These contacts are designated:

I 26 to V 17. In the distributor

(Sheet 3) these 120 currents are scanned one after the other in such manner that groups of 30 work together.

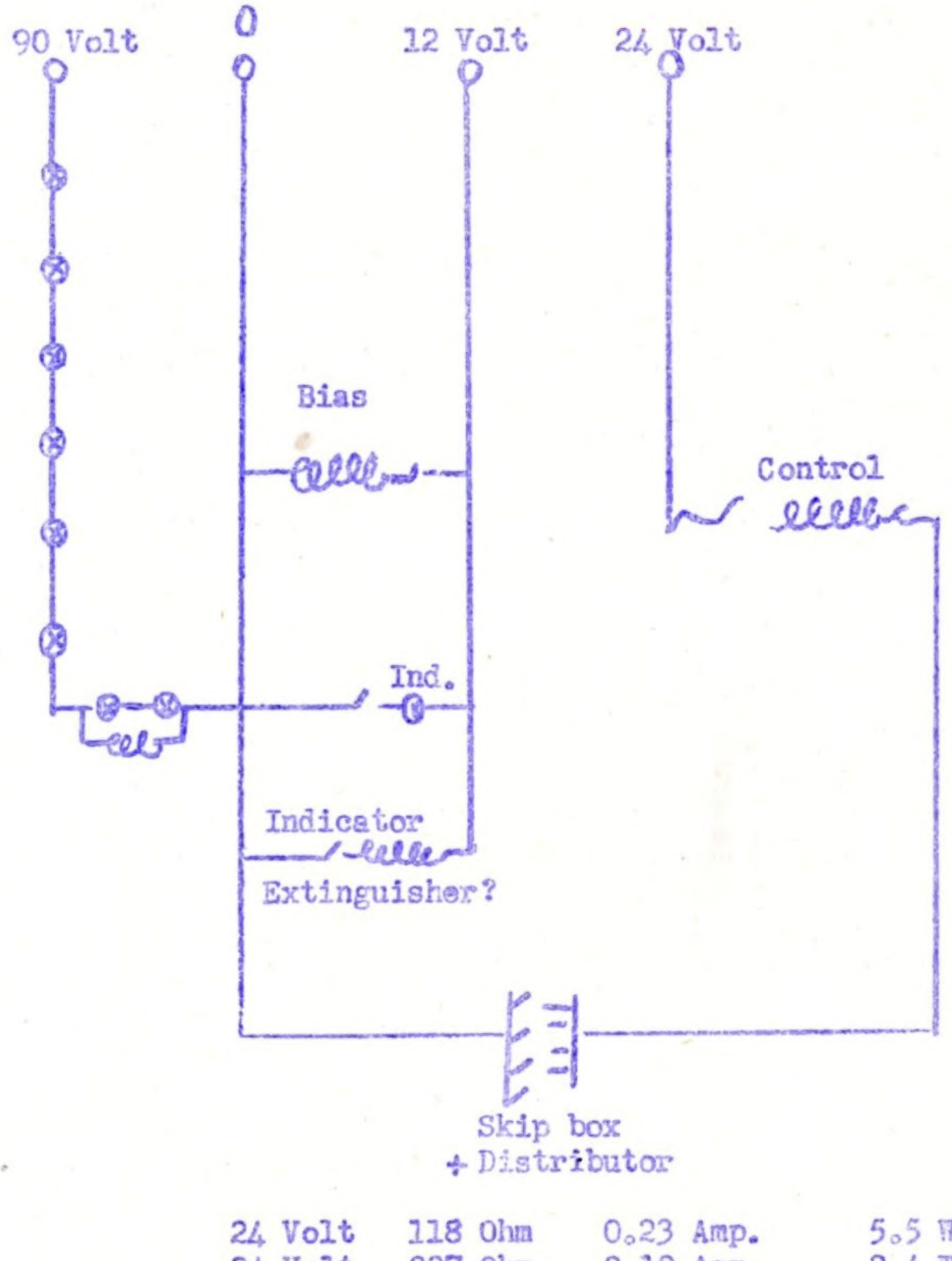
Sheet 4). Shows how control and test circuits work together. Care must be taken to insulate the various circuits from one another and between the several voltages. The sample case on sheet 4 shows the functioning of the entire apparatus. By the distributor and the plugboard the vertical columns are set, by the test current the horizontal sequences are examined.

On the supplemental sheet the distributor is shown in greater detail.



Green-Connections
25 Test Unit
26-17 to the Skipbox

Circuit Diagram with Data:



1	Switch	24 Volt	118 Ohm	0.23 Amp.	5.5 Watt
1	Relay	24 Volt	237 Ohm	0.10 Amp.	2.4 Watt
	Test Circuit	90 Volt	116 Ohm	0.78 Amp.	70.0 Watt
	Biass	12 Volt	3.4 Ohm	3.5 Amp.	42.0 Watt
	Control Circuit:				
	Control Circuit:				

Maximum current passing through 14.31 Amp.

Maximum total consumption? 448 Watt